

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

[SIXTH SERIES.]

No. 36. DECEMBER 1890.

LII.—*Natural History Notes from H.M. Indian Marine Survey Steamer 'Investigator,' Commander R. F. Hoskyn, R.N., commanding.*—No. 20. *On some undescribed Shore-Fishes from the Bay of Bengal.* By A. ALCOCK, M.B., Surgeon I. M. S., Surgeon-Naturalist to the Survey.

CONTENTS.

- § 1. Introduction and Sketch of the Habitat.
- § 2. Descriptions of New Species.

§ 1. *Introduction and Sketch of the Habitat.*

BETWEEN the 11th November, 1889, and the 25th March, 1890, the 'Investigator' trawled, on occasion, in shallow water off the south-east coast of Ceylon (32 fathoms), off the east coast of the Andaman chain and in the Gulf of Martaban (20 to 41 fathoms), and systematically along the east coast of the Indian peninsula between lats. $17^{\circ} 50'$ and $19^{\circ} 50'$ N. in depths ranging from 7 to 102 fathoms.

In the class of Fishes numerous forms previously unnoticed in the Indian fauna and also forms apparently hitherto undescribed were taken; and the present paper is devoted to those among the latter which were collected inside the 50-fathom line. Of these there are thirteen species to notice,

namely, one from Ceylon, two from the Andaman side, and eleven (including one common to two conventional localities) from the east coast of India.

A short sketch of some of the more obvious physical and faunistic features of the 'Investigator's' trawling-stations may first be given.

i. *The South-east Coast of Ceylon* is rocky and reefy, and on the occasions in this and previous years on which the 'Investigator' has used the trawl here the bottom has been found to consist of coarse sand and broken shells and a shingle of irregular fragments of coral, with worn and eroded surfaces more or less incrustated with Foraminifera, Sponges, Hydrozoa, Bryozoa, &c. These in their turn shelter, among other things, crowds of small Crustaceans—Leucosine crabs being predominant—which, in their colour, in their form and sculpture, and in their curious cataleptiform attitudes, furnish most wonderful examples of protective resemblance to their animate and inanimate surroundings. The ground-fishes taken here too (*Rhomboidichthys polylepis*, *Rh. angustifrons*, *Rh. azureus*, *Samaris cristatus*), in the complicated and undescribable mottling and variegation of their upper surfaces, show most remarkable harmonies with their environment.

ii. *The Andaman Chain*.—Off the rocks and reefs we again meet with a clean bottom of incrustated rock and coral shingle, with a profusion of Hydrozoa, Polyzoa, Comatulids, &c., harbouring small Crustaceans. But the ground is too rough for the use of the trawl; and the tangles, which alone are available, have not brought up many fishes.

iii. *The Gulf of Martaban*.—Here the bottom is formed of the copious silt of the Irrawádi, Sittang, and Salween Rivers, and the marine fauna has the well-known facies of all Indian deltas.

iv. *The Ganjam Coast*.—The 120 miles of this part of the east coast of the peninsula, along which the systematic trawling of the 'Investigator' was carried on during the season, are characterized by low-lying sand-dunes, broken by the numerous creeks and swamps into which the small river-channels from the Eastern Gháts open. The sea is shallow (the 100-fathom line being from 18 to 23 miles distant from shore), and the bottom consists of mud or of fine sand, though occasionally a rocky patch with a profuse Cœlenterate fauna is met with.

Setting aside the last, where the details of the fauna strongly recall those of the south-east coast of Ceylon, one is able to distinguish three well-marked bathymetric ranges of life along this coast.

a. Within the limits of the first, which extends from the

surf-line to about 14 fathoms, almost every successful haul of the trawl will contain specimens of all of the following, several of them in great numbers:—

Veretillum; sea-anemones with sandy tests or commensal with hermit-crabs or *Dorippe*; *Astropecten*; *Nerocila*, *Squilla*, *Penæus*, *Pagurus*, *Dorippe*, *Philyra*, *Iphis*, *Calappa*, *Matuta*, *Egeria*, *Doclea*, *Neptunus*, *Goniosoma*; *Murex*, *Sepia*; various well-known Indian shore-fishes; *Hydrophis*, *Enhydrina*.

These are the characteristic forms of this zone.

Within these limits have been found an undescribed Trichonotid and three undescribed Pleuronectids, two of which are examples of a new generic type.

b. From 20 to 40 fathoms the hauls are usually small and the collections quite characteristic. Within these limits, with the exception of the common spiny *Murex* and a few Pleuronectidæ (*Psettodes erumei*, *Pseudorhombus javanicus*, *Cynoglossus oligolepis*, and *Synaptura quagga*), none of the first-mentioned forms have been taken. In almost every haul specimens of the following will occur:—simple Turbinolid Corals; *Stellaster*, *Clypeaster*; *Crangon*, *Thenus*, small Leucosines; *Uranoscopus cognatus*, *Platycephalus asper* or *P. spinosus*, *Brachypleura xanthosticta*, *Arnoglossus macrolophus*, *Læops Guentheri*, and sometimes *Champsodon vorax* and *Lophius indicus*.

Up to date the great majority of fishes taken in this zone have been found to be new to the Indian record or new to science; and it seems very probable that the same will prove true for the other groups. Unfortunately no continuous readings of the bottom-temperature were taken; but occasional experiments showed that up to 14 fathoms there was no difference between the temperatures at the surface and at the bottom, while at 23 fathoms the temperature at the bottom was lower than that at the surface by 3° Fahr.

c. From 70 to 100 fathoms the hauls again become large and varied, but the forms begin to show a pronounced bathybial facies, and nothing is seen of the forms which characterize the two shallower zones. So far, although the hauls of fishes have been big and varied, the only known Indian shore-fish encountered has been *Halieutaca stellata*. A successful trawling in this zone is most interesting; and from a rich harvest of marine animals—many of which are either moribund or quite dead on reaching the surface—we shall be able every time to pick out the following characteristic species:—a peculiar Penæid*, the Oxyrhynch crab

* Characterized by Prof. J. Wood-Mason as a most remarkable form closely allied to *Solenocera*.

Encephaloides *, a large Oxystome crab near *Philyra*; a delicate mussel, the carnivorous Gastropod Mollusk *Rostellaria*; and the fishes *Parascombrops pellucidus* and *Scianectes*. In the class of fishes, indeed, almost everything appears to be new, and everything is interesting. Here have been found a species of *Centropristis* and a species of *Prionotus*, both being types not hitherto regarded as Indian. The occurrence of *Trigla hemisticta* must also be noticed.

It is unfortunate that for this zone too we have no continuous temperature readings; but, so far as occasional experiments go, the temperature at the bottom appears to be from 15° to 16° Fahr. lower than the temperature at the surface.

The new fishes from this zone have been described in previous papers.

§ 2. Descriptions of New Species.

A CANTHOPTERYGIL.

Family Scorpænidæ.

MINOUS, C. & V.

Minous coccineus, sp. n.

D. 10/ $\frac{1}{2}$. A. 12.

Head broad, its length about $3\frac{2}{3}$ in the total. Body compressed, its height just over $\frac{1}{4}$ of the same. The bones of the head strong, massive, rugose, "carious" in appearance; præorbital with two strong spines, of which the posterior is recurved and much the longer; the infraorbital ring forms a broad, massive, salient buttress, ridged and furrowed, but not spiny; preoperculum with a strong sharp spine at its angle and two smaller coarse ones below; interoperculum serrulated; operculum small, with two diverging weak stays; a deep crescentic "carious" excavation across the occiput; occipital and temporal spines strong, coarsely serrated.

Snout truncate; its breadth is greater than its length, which is less than that of the eye; lower jaw the more prominent, each limb with two or three barbels. Eyes deep-set, their major diameter one third of the head-length; a short broad tentacle above the pupil; supraorbital margin coarsely crenulated; infraorbital margin thin, sharp, very salient, incomplete behind and also in front, where there is

* *Encephaloides Armstrongi*, Wood-Mason, MS.

left a well-marked groove which recurves across the cheek; interocular space narrowest in the middle, where its width is barely $\frac{3}{4}$ the vertical diameter of the eye; occupied by numerous longitudinal serrated crests, with deep furrows intervening. Nostrils tubular.

Mouth broad; the maxilla does not reach the vertical through the middle of the orbit. Villiform teeth in the jaws and in a narrow band on the bevelled edge of the vomer.

Gill-openings moderately wide; gill-membranes united to the isthmus; fourth gill-cleft a small foramen. Integument thick, investing all the fins except the caudal. All the fin-rays simple.

Dorsal fins separated by a deep notch; the spinous portion is very irregular; the first spine is very small, the second and third, which are of nearly equal length—not quite half that of the head—are isolated from each other and from the rest of the fin; the fourth, fifth, and sixth, which are of nearly equal length *inter se*—almost half that of the head—form an isolated group; the next four, which are short and weak, form another isolated group; the spine of the second dorsal fin is more than half the length of the head and longer than the soft rays. Caudal truncated. Pectoral nearly as long as the head; its appendage, which is very thick and rigid, reaches to the second anal ray. Ventral adherent to the abdomen through the greater part of its extent, reaching to the vent.

Colours in life:—Crown and nape deep brown, throat milk-white, body and fins deep crimson, becoming very dark at the margins of the spinous dorsal, anal, and paired fins; inner surface of pectorals dark brown, with broad canary-yellow lines forming a hexagonal pattern. The crimson is dissolved out in spirit.

Air-bladder small. Two pyloric appendages.

Length 4.25 inches.

Off Ganjam coast, 28 to 30 fathoms; bottom sand and shells.

Family Cottidæ.

LEPIDOTRIGLA, Gthr.

Lepidotrigla spiloptera, Gthr.

Lepidotrigla spiloptera, Günther, Zool. Chall. Exp. vol. i. pt. vi. p. 42, pl. xviii. fig. C.

Var. nov. *longipinnis*.

One specimen, answering in every respect, even in the

details of coloration, to Dr. Günther's description; but the pectorals reach to the ninth anal ray.

Off Ganjam coast, 18 fathoms; bottom sand, shells, sponge-incrusted rock, &c.

Family Trichonotidæ.

TÆNIOLABRUS, Steindachner.

Tæniolabrus, Steindachner, Sitz. Ak. Wiss. Wien, 1867, lv. i. p. 713.

Tæniolabrus cyclograptus, sp. n.

B. 7. D. 49-50. A. 39-40. L. lat. 57-59. L. tr. $\frac{5}{3}$.

Head low, elongate, tapering, its length nearly one fifth of the total without, nearly one sixth with, the caudal. Body low, elongate, eel-like, its height not quite two fifths the length of the head.

Snout twice as long as the eye, depressed, acute, its tip formed by the mandible; nostrils minute. Eyes superior, but with lateral visual axis, separated by a carinated ridge; their major diameter $6\frac{1}{2}$ in the head-length.

Mouth wide, its cleft subhorizontal; the lower jaw projecting nearly half an eye-length beyond the upper and closing against a prominent tubercle formed by the enlarged end of the premaxillary; the upper jaw reaches to the vertical through the middle of the orbit. Acute villiform teeth laterally in the premaxillæ and in the vomer and palatines; small canines on the premaxillary tubercle and laterally in the lower jaw, increasing in size in front, where they stand outside the closed mouth.

Gill-opening very wide, extending almost to the mandibular symphysis; branchiostegals and suboperculum much produced backwards; gill-rakers on first arch long, close, setiform. Pseudobranchiæ present.

Head naked; body covered with rather large, imbricating, cycloid scales. Lateral line traversing the middle of the body uninterruptedly, its tubes salient. All the fins with their rays slender, and, except in the pectorals, conspicuously prolonged.

The dorsal fin, which occupies almost the entire extent of the back, has the first four radial elements weak and flexible though unarticulated, and the remainder articulated but simple; the rays gradually decrease in length from the first, which is thrice, to the last, which is nearly twice, the greatest height of the body. The anal begins nearly a head-length

behind the gill-opening, and occupies the entire extent of the tail; all its rays are articulated and branched at the tip, their average height being about half the average height of the dorsal.

Caudal hastate, with thirteen branched rays, of which the longest one, situated medially, is $4\frac{1}{2}$ in the total length. Pectorals pointed, nearly as long as the postrostral portion of the head. Ventrals subangular, with one flexible spine and five rays, the longest of which is more than three fourths the length of the caudal.

Stomach siphonal; no pyloric cæca; no air-bladder.

Colours in life:—Body, like the head, burnished metallic gold, vertical fins hyaline, both serried with brilliant torquoise-blue ocelli arranged in parallel longitudinal rows; ten such rows, of about fifty each, along the dorsal fin, three such, of sixty each, along the head and body, and three, of about forty each, along the anal fin; along the dorsal half of the body are twelve inconspicuous, equidistant, broad, dusky bands. In spirit the gold fades, the dusky bands become very dark and distinct, and the ocelli change to dark grey rings.

Length 6·1 inches.

Ganjam coast, 10 to 13 fathoms; bottom sand.

Dr. Steindachner (*loc. cit.*), who unfortunately had but one small specimen, which could not be spared for dissection, to examine, doubtfully referred *Teniolabrus* to the Labridæ.

I have examined seven specimens and dissected one, and I find that the lower pharyngeal bones, which Dr. Steindachner was unable to investigate, are not coalesced. From the above

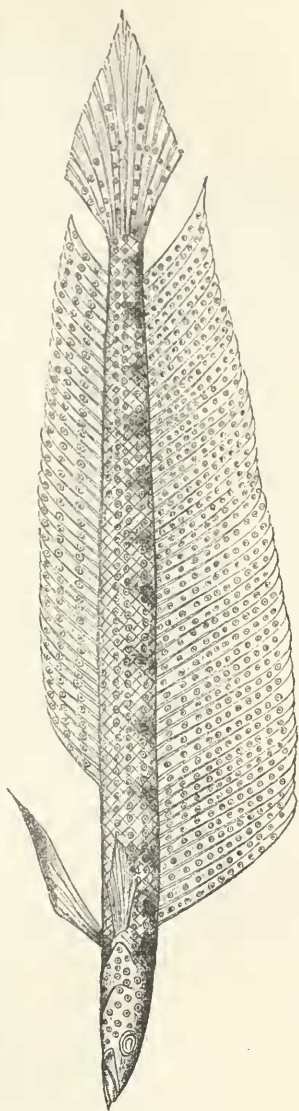


Fig. 1.

description it will, I think, be admitted justifiable to class *Teniolabrus* among the Trichonotidæ.

Family Gobiidæ.

AMBLYOPUS, C. & V.

Amblyopus arctocephalus, sp. n.

D. $4\frac{6}{3}$. A. 41. L. rect. 50-52.

Head angular, its opercular region somewhat inflated, its vertex compressed into a sharp carina, its length one sixth of the total.

Body compressed, its height, which is $7\frac{1}{2}$ in the total, diminishes very slightly from nape to base of caudal. Eyes completely hidden.

Snout broad, with the lower jaw prominent. Mouth-cleft oblique, wide, the length of the maxilla being $2\frac{3}{4}$ in that of the head; the upper lip with a short broad barbel on each side; the mandibular symphysis with a bony rugose knob. In each jaw a row of small, close, even, acute teeth, and external to these in the front of the premaxilla, on each side, two large canines, and in the mandible five, of which two are lateral and one (the largest) median.

Head naked; body covered with thin, smooth, hardly imbricate scales, which increase in size from before backwards.

Dorsal and anal fins low, enveloped in skin, confluent with the pointed caudal. Pectorals with the four or five upper rays as long as the maxilla, the lower rays extremely short. Ventrals jugular, small, cohering; their length is not quite one third the body-height.

Stomach large, saccular; no pyloric cæca. A large, globular, thick-walled air-bladder. Anal papilla large, bilobed. Eleven abdominal, seventeen caudal vertebrae.

Colours in life mottled pink, fins hyaline.

Length 5 inches.

Off Máhánaddi Delta, 50 fathoms; bottom mud. Off Vizagapatam coast, 20 to 25 fathoms; bottom mud.

ANACANTHINI.

Family Ophidiidæ.

DINEMATICHTHYS, Bleeker.

Dinematichthys piger, sp. n.

D. circ. 75. A. circ. 55. L. lat. circ. 90.

Head conoid, inflated, with loose integument; its length

$4\frac{1}{2}$ in the total. Body elongate, compressed; its height is hardly equal to the length of the postrostral portion of the head.

Snout broad, inflated, obtusely pointed; its length, which is one fifth that of the head, is twice that of the small sunken eye and barely equal to the width of the convex, pitted, inter-orbital space. Nostrils adjacent to the eye.

Mouth wide, oblique, with the jaws exactly conterminous in front; the maxilla, which is half as long as the head, is much expanded behind. Villiform teeth in the upper jaw and vomer and in a long row on the palatine; caniniform teeth in the lower jaw.

Gill-opening very wide; gill-covers much expanded; operculum with a long spine; gill-rakers few, small. Scales small, smooth, rather deciduous, covering the body and the preopercular region. Lateral line apparently ending in the anterior half of the body.

Dorsal and anal fins enveloped in thick skin; the dorsal begins in the vertical through the middle of the pectorals, the anal just in front of the vertical through the middle of the body. Caudal entirely free. Pectorals broad, truncated, half as long as the head. Ventrals uniradial, nearly as long as the head.

Colours in life uniform dark brown, almost black.

Length 2.4 inches.

Hiding under rocks in pools in coral-reefs of Great Coco Island, Andaman Archipelago.

Family *Pleuronectidæ*.

ARNOGLOSSUS, Blkr.

Arnoglossus macrolophus, Alcock.

Arnoglossus macrolophus, Alcock, Journ. As. Soc. Beng. vol. lviii. pt. ii. pp. 280, 281, pl. xviii. fig. 2.

This species appears to be very common off the Ganjam coast in 25 to 35 fathoms. The elongation of the anterior rays of the dorsal fin is a secondary sexual character displayed by the adult males alone.

Arnoglossus brevirectis, sp. n.

D. 76-80. A. 60-62. C. 17. P. 10. V. 6. L. lat. 55.

Body rather elongate; its greatest height about $2\frac{3}{4}$ in the total with the caudal. Length of the head $4\frac{1}{2}$ in the same standard and equal to its height.

Snout obtusely pointed, scaleless; its length is not quite two thirds the major diameter of the eye, which is one third the head-length. Eyes on the left side, separated by a very thin and sharp decliving ridge; the lower in advance of the upper.

Mouth small; the maxilla, which barely reaches behind the vertical through the anterior limit of the lower eye, is $3\frac{1}{2}$ in the head-length. Minute, even, close, uniserial teeth in both sides of both jaws.

Gill-membranes broadly united; gill-rakers small, smooth. Scales of moderate size, fairly adherent and strongly ctenoid on the coloured, cycloid and very deciduous on the blind side. Lateral line with a strong supra-pectoral curve.

The dorsal fin begins almost on the tip of the snout; its highest rays (in the female) are not quite equal to the corresponding anal rays, which are nearly one third the maximum body-height. Caudal obtusely rounded, its length one sixth of the total. The rays of all the vertical fins scaly. Right pectoral equiradial with, but much narrower and shorter than, the left, which is as long as the portion of the head behind the middle of the lower eye. Left ventral with the rays in a linear series along the middle abdominal line.

Colours in life:—Left side dusky brown, with indefinite blackish patches round the body inside the vertical fins and along the lateral line, and with black speckles on all the fins.

Two female specimens with enlarged ovaries.

Length 2·8 inches.

Off Ganjam coast, 30 fathoms; bottom sand and shells.

This species appears to be closely related to the preceding.

RHOMBOIDICHTHYS, Blkr.

Rhomboidichthys polylepis, Alcock.

Arnoglossus polylepis, Alcock, Journ. As. Soc. Beng. vol. lviii. pt. ii. pp. 290, 291, pl. xvi. fig. 1.

A large mature female with gravid ovaries was taken off the south-east coast of Ceylon in 32 fathoms.

In this female specimen the interorbital space is two fifths of the snout-length in width, deeply concave, scaleless; the maxilla measures one third the head-length; the first two rays of the dorsal fin (which in the male(?) are detached and curiously thickened at their bases) are small, unmodified, and continuous with the rest of the fin. The pectoral fins of both sides are also slightly more developed than in the male(?).

This species appears to be closely allied to the next following.

Rhomboidichthys angustifrons, Gthr.

Rhomboidichthys angustifrons, Günther, Zool. 'Challenger' Exp. vol. i. pt. vi. p. 46, pl. xxi. fig. B.

Off south-east coast of Ceylon, lat. $6^{\circ} 6' 30''$ N., long. $81^{\circ} 23'$ E., 32 fathoms; bottom sand, shells, dead coral, &c.

Rhomboidichthys azureus, Alcock.

Rhomboidichthys azureus, Alcock, Journ. As. Soc. Beng. vol. lviii. pt. ii. pp. 283, 284.

Off south-east coast of Ceylon, as above, 32 fathoms.

Also met with all along the Ganjam coast, in depths ranging from 11 to 33 fathoms, and in places where the bottom consists either of hard sand, or of broken shells, rock, and dead coral.

Examination of a large number of specimens shows the radial formula to be

D. 84-90. A. 64-70. C. 17. L. lat. 55.

The lateral line on the blind side has no suprapectoral curve, but simply rises gradually to the post-temporal region.

The males of this species, in addition to the brilliant blue spots on the snout, are altogether brighter coloured than the females; on the blind side too they show a large, subcutaneous, pyriform, black patch.

Rhomboidichthys valde-rostratus, sp. n.

D. 84. A. 64. L. lat. 48.

Body pyriform; its height very nearly half its length, including the caudal. Head slightly over $\frac{2}{3}$ of the same standard in length, and half again as high as long; its anterior profile almost vertical.

Snout abruptly prominent, in length barely $\frac{3}{4}$ the major diameter of the eye, bearing on its left side an advanced, up-curved, bifid horn of equal length. Eyes on the left side, prominent, in diameter about $\frac{2}{7}$ of the head-length; the lower nearly half its length in advance of the upper; internal orbital margins strong, thick, salient, and spiny. Interorbital space deeply concave, scaly, except for a narrow bridge of naked skin in its anterior part; its width is nearly a diameter and a half of the eye. Nostrils small; the anterior tubular, the posterior subtubular on the coloured side.

Mouth-cleft moderate, approaching the vertical; the length

of the maxilla is nearly $\frac{1}{3}$ that of the head. Teeth numerous, close-set, even, acute, uniserial, in both jaws.

Gill-membranes united; gill-rakers few, short. Scales of moderate size, adherent; thick and strongly ctenoid on the coloured, cycloid on the blind side. Lateral line with a supra-pectoral curve; its scales small and faintly bilobed. The longest dorsal rays, which exceed the corresponding anal rays, are $\frac{1}{4}$ the body-height. Paired fins much more developed on the coloured side, where the pectoral has its upper rays prolonged equal to $\frac{1}{3}$ the length of the body measured without the caudal.

Colours in life :—Left side brown, with irregular black blotches, the three largest of which are on the lateral line, while the others form a series round the body; several transverse series of deep blue spots in the interorbital space anteriorly; right side with a transverse black band behind the mouth and with a number of indefinite dark blotches arranged in a large triangular patch in the middle of the body.

Total length 3.75 inches.

Off the south-east coast of Ceylon, 32 fathoms, as above.

This species is closely allied to the next preceding, and the single specimen appears to be a male.

At several stations off the Ganjam coast there have been taken some curious dwarf Pleuronectids which, in consequence of their diminutive size and the transparency of their tissues, one is at first inclined to regard as either larval or stunted forms. But in the relative proportions of the body, in the completed asymmetry (shown in the unilateral disposition of the eyes, the unilateral restriction of pigment, and the slight unilateral atrophy of the paired fins), in the perfect ossification of the skeleton, and in the character of the vertical fins, one sees indications of development sufficiently advanced to permit of tolerably accurate generic and specific discrimination. The outline of the body is like that of *Rhombus*, but more circular; the nature of the mouth and dentition and the disposition of the eyes are similar to *Rhomboidichthys*.

PSETTYLLIS, gen. nov.

Allied to *Rhomboidichthys*?

Body subcircular. Jaws and dentition symmetrical; mouth very small, the length of the maxilla being less than one fourth that of the head; teeth minute, in the jaws only. Eyes on the left side, separated by a broad concave space.

The dorsal fin commences on the snout ; its rays and those of the anal simple. No scales. Lateral line with a sharp or faint curve above the pectoral.

Psettyllis pellucida, sp. n.

D. 85. A. 65. C. 17. P. 5. V. 6.

Body naked, subcircular, its height being $\cdot 96$ of its length without the caudal. The height of the head is more than twice its length, which is about $4\frac{2}{3}$ in the same standard. Profile of the snout almost merged in the anterior profile of the body. Eyes small, situated on the left side of the head close to its anterior profile, the lower slightly in advance of the upper ; interorbital space concave ; its width is a little more than twice the major diameter of the eye.

Mouth minute, symmetrical ; teeth minute, in both sides of the jaws.

Gill-membranes broadly united below. Lateral line with a slight open curve above the pectoral.

All the fins delicate ; the vertical fins low ; the paired fins small and nearly equally developed on both sides. Caudal as long as the head. The dorsal begins almost on the horizontal through the upper limit of the lower eye.

Quite transparent in life ; iris black ; on the left side a few variable black blotches on the body and numerous black blotches on the fins.

Length 1.58 inches.

Off Ganjam coast, 9 to 13 fathoms ; bottom sand. Off Vizagapatam coast, 7 to 8 fathoms, bottom sand ; and 20 fathoms, bottom mud.

Psettyllis ocellata, sp. n.

D. 85. A. 65. C. 18. P. 9? V. 6.

Body naked, subcircular, its height being $\cdot 78$ of its length without the caudal. The height of the head is not quite twice its length, which is about one fourth of the same.

Profile of the snout merged in that of the head. Eyes small, on the left side of the head, close to its anterior profile, the lower slightly in advance of the upper ; interorbital space concave ; its width is barely twice the major diameter of the eye.

Mouth symmetrical, small, the length of the maxilla being $4\frac{2}{3}$ in that of the head ; teeth minute, in both sides of the jaws.

Gill-membranes broadly united below. Lateral line on the coloured side with a strong, on the blind side with a wide shallow, curve above the pectoral.

All the fins delicate; the vertical fins low; the paired fins nearly equally developed on both sides, the left pectoral being nearly as long as the caudal, which is about one fifth of the total. The dorsal begins almost on the horizontal through the upper limit of the lower eye.

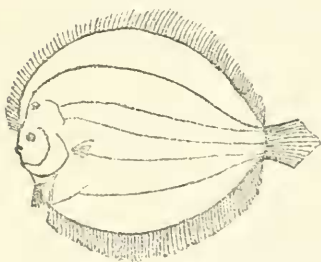
Transparent in life; on the left side, behind the supra-pectoral curve, a most perfect dark ocellus; two large round black spots on the straight part of the lateral line; a series of dark perfectly-formed black rings round the body, and outside these a series of dark round spots.

Length 1·5 inches.

Off Ganjam coast, 9 to 13 fathoms, as above. Off Vizagapatam coast, $7\frac{1}{2}$ to $9\frac{1}{2}$ fathoms; bottom sand.

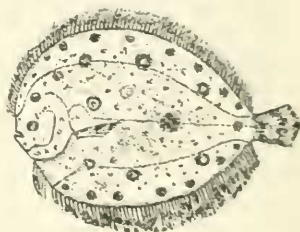
Specimens of these curious fishes were taken at altogether four stations between the middle of December and the end of February. The other Pleuronectids captured at the same time were species of *Rhomboidichthys*, *Solea*, *Synaptura*, and *Cynoglossus*.

Fig. 2.



Psettyllis pellucida.

Fig. 3.



Psettyllis ocellata.

LEOPS, Gthr.

Leops Guentheri, sp. n.

D. 94-98. A. 79-80. C. 16. P. d. & s. 13.

V. d. & s. 6.

Body regularly elliptical, its height about $2\frac{3}{4}$ in the total without the caudal. Length of the head $4\frac{1}{2}$ to $4\frac{5}{7}$ in the same standard and almost exactly equal to its height.

Snout obtusely pointed, very short, its length about half the major diameter of the eye, which is about $\frac{1}{3}$ of the head-length. Eyes on the left side, separated by a ridge, the lower slightly in advance of the upper, which bulges into the dorsal profile.

Mouth small, twisted towards the right, its cleft approaching the vertical; the maxillary barely reaches the vertical from the anterior limit of the lower orbit. Villiform teeth in the jaws on the blind side only.

Gill-cleft narrow, the gill-membranes united together throughout. Minute very deciduous scales. Lateral line with a strong supra-pectoral curve.

The dorsal fin begins in front of the eye and ends on the base of the caudal; its first two rays are isolated; its longest rays, about the middle, are $\frac{1}{3}$ the greatest body-height and equal to the corresponding anal rays. Pectorals almost equally developed; the left, which is slightly longer than the right, equals the length of the head behind the middle of the lower eye. Ventrals equally developed; the left is in the same straight line with the anal. Caudal obtusely pointed; its length about $6\frac{1}{2}$ in the total.

Colours in life:—Deep ruddy brown; vertical fins and left ventral black.

Length of largest specimen 4.5 inches.

Found (1) in the Gulf of Martaban, 20 fathoms, bottom mud; (2) off Ganjam and Vizagapatam coasts in 15 to 30 fathoms, usually on muddy bottoms, but sometimes on sand, broken shells, &c.

This species is very similar to *Læops parviceps*, Günther, but the characters which distinguish it are so constant throughout a number of individuals, that one is obliged to recognize their specific value.

SOLEA, Gthr.

Solea cyanea, sp. n.

D. 77. A. 54. C. 18. P. 0. V. 5. L. lat. 78–80*.

Body elongate; its height in the total is $2\frac{2}{3}$ with, $2\frac{1}{2}$ without the caudal. The length of the head is about $4\frac{1}{3}$ in the latter standard and about one fourth less than its height.

Snout semicircular in outline; its length is one third that of the head and twice the diameter of the eye. Eyes circular,

* To its termination behind the upper eye.

separated by a very narrow scaly space; the upper nearly half its length in advance of the lower.

The anterior nostril of both sides is a slender tube; the one on the coloured side, which is the longer, measuring a diameter of the eye.

Mouth curved, to form a blunt truncated rostral hook, which does not reach halfway to the vertical from the anterior limit of the upper eye; its angle extends well behind the vertical from the middle of the lower eye. Villiform teeth on the blind side only. Mid mento-jugular line fringed with ciliiform barbules.

Gill-openings narrow; the branchiostegal rays and membrane project beyond the opercular margin. Scales uniformly small, strongly ctenoid on both sides. Lateral line straight, ending on the coloured side an eye-length behind the upper orbit.

The dorsal fin begins on the tip of the snout in the form of a few filiform rays, and extends, as does the anal, to the base of the caudal; the highest rays are half the length of the caudal, which is $5\frac{3}{4}$ in the total; all the vertical fin-rays scaleless. No pectoral fins. Ventrals symmetrical, lateral, separated from the origin of the anal by a wide interval.

Colours in life:—Body and fins on right side very dark olive, with some blackish flecks arranged in five cross series; on the left side uniformly clouded with blue-black.

Length 3·8 inches.

Off Ganjam coast, 33 fathoms; bottom sand. Off Vizagapatam coast, 20 to 25 fathoms; sand, mud.

In spirit both sides dull blue-black, the left side being the lighter.

SYNAPTURA, Cantor.

Synaptura quagga (Kaup).

Æsopia quagga, Kaup, in Wieg. Archiv, 1858, p. 98.

Synaptura quagga, Günther, Cat. iv. p. 485.

In the Journ. As. Soc. Beng. vol. lviii. pt. ii. p. 286, I erroneously stated that this species was to be found in 7 to 10 fathoms on the east coast of India. This should have applied to *S. zebra* (Bloch). *S. quagga* (Kaup) has been taken by the 'Investigator' only between 26 and 33 fathoms.

Synaptura altipinnis, sp. n.

D. 81. A. 66. C. 18. P. 9. V. 4. L. lat. 135 *.
L. tr. $\frac{3}{4}$.

Body oval; its height a little over one third the total measured to the tip of the caudal. Length of the head one sixth of the same, one third higher than long.

Snout obtuse, a little longer than the lower eye, which is one fifth the head-length in the major diameter; upper eye smaller, about a third its diameter in advance of the lower. Interorbital space less than half a diameter of the eye in width, scaly.

A very short tubular nostril on the coloured side; the other nostrils indistinguishable.

The mouth-cleft reaches beyond the vertical through the middle of the lower eye. Mid-mento-jugular line with thick-set ciliiform barbules.

Gill-opening very narrow; the gill-membranes on both sides expanded above and annexed to the bases of the pectorals. Scales very sharply ctenoid on both sides, slightly increased in size in the posterior half of the body. Lateral line as in *S. zebra*, on both sides.

Dorsal and anal fins confluent with the caudal up to its tip; the dorsal begins just in advance of the upper eye, its rays, like those of the anal, increasing very gradually in length from before backwards, the hindmost measuring more than one third of the greatest body-height and a little more than the corresponding anal rays. Caudal broad, fan-shaped, its length $6\frac{1}{2}$ in the total. Pectorals symmetrical, very small, the longest rays being not quite $\frac{3}{4}$ the major diameter of the eye. Ventrals also very small, about as long as the snout.

Colours in life:—Right side of body and fins striped, in the manner of *S. quagga*, in alternate cross bands of purple-brown and ash-brown, to the number of twenty-eight; caudal purple-brown, with large ash-brown blots.

One specimen, 7.25 inches long.

Off Vizagapatam coast, 25 fathoms; bottom mud.

* From origin on snout to base of caudal.

CYNOGLOSSUS [Ham. Buch.].

Cynoglossus versicolor, sp. n.

D. 112. A. 88. C. 10. V. 4.

L. lat. 75 to gill-opening.

Body tapering acuminate to the caudal; its height $4\frac{1}{2}$ in the total. Height of the head about one fourth greater than its length, which is about one sixth of the total.

Snout symmetrically rounded; its length is one third that of the head; rostral hook not extending behind the level of the mandibular symphysis. Eyes nearly circular, the diameter one seventh of the head-length; the upper a third of a diameter in advance of, and half a diameter apart from, the lower, which is so situated as to much erode the outline of the lip. On the coloured side only one nostril, in the form of a rather long slender tube situated in front of the lower eye; on the blind side two, the anterior of which is a short tube.

Mouth small, its angle nearer to the tip of the snout than to the gill-opening. Scales ctenoid on both sides. Two lateral lines on the coloured side, branching and anastomosing on the head; the upper, which ends just in front of the posterior fourth of the body, is separated from the lower, which is continuous to the base of the caudal, by twelve rows of scales. No lateral line on the blind side. One ventral fin united to the anal by a broad membrane. The highest [middle] anal rays slightly surpass the corresponding dorsal rays, which equal the snout in length.

Colours in life:—Left side yellowish brown, profusely marbled with chestnut-brown and sepia; a large ocelliform red-brown patch, with a yellow areola on the abdomen just behind the gill-opening.

Length nearly 5 inches. One specimen.

Off the Orissa coast, 11 fathoms; bottom hard sand.

Cynoglossus praeisus, sp. n.

D. 112. A. 88. C. 8. V. 4. L. lat. 65 to gill-opening.

Height of the body one fourth of the total. Height of the head one eighth greater than its length, which is nearly one fifth of the total.

Snout obtusely pointed; its length is $3\frac{1}{4}$ that of the head; rostral hook not extending behind the mandibular symphysis.

Eyes almost in contact, the upper slightly in advance of the lower, which is on the lip; their major diameter is more than one sixth the head-length. On the coloured side only one nostril, in the form of a rather long slender tube situated in front of the lower eye; on the blind side two, the anterior of which is a short tube.

Mouth small, its angle nearer to the tip of the snout than to the gill-opening. Scales ctenoid on both sides. Two lateral lines on the coloured side, which branch and anastomose on the head; the upper, which ends immediately behind the vertical through the middle of the body, is separated from the lower, which is continuous to the base of the caudal, by ten rows of scales. No lateral line on the blind side. One ventral fin united to the anal by a broad membrane. The highest [middle] dorsal and anal rays considerably exceed the length of the snout.

Colours in life :—Left side uniform sepia-brown.

Length nearly 5 inches. Two specimens.

Off Ganjam coast, 33 fathoms; bottom sand.

These two species are closely allied, both belonging to the subgenus *Trulla*, Kaup.

LIII.—*Report on the Corals from the Tizard and Macclesfield Banks, China Sea.* By P. W. BASSETT-SMITH, Surgeon R.N.

[Concluded from p. 374.]

Section MADREPORARIA FUNGIDA.

Genus SIDERASTRÆA, Blainville.

Siderastræa?, sp. n.

A large, massive, incrusting specimen about 22 centim. in diameter, the upper surface uneven, with blunt rounded ridges, thickly covered with subpolygonal or compressed calices, from 3 to 6 millim. in width. Walls thin, but only visible here and there; they are apparently thick at the surface. The septa from 22 to 30 in number, very thin, plate-like, their sides minutely spined, the margins subentire or very minutely serrate, their upper edges above the calice-walls sometimes confluent with adjoining septa. Apparently no columella, but numerous dissepiments. Calices deep; the larger septa reaching nearly to the centre.